

Exhibit A

**IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE**

AGROFRESH INC.,

Plaintiff,

V.

C.A. No. 16-662-MN-SRF

ESSENTIV LLC, DECCO U.S. POST-HARVEST, INC., CEREXAGRI, INC. d/b/a DECCO POST-HARVEST, and UPL, LTD.,

Defendants.

**DEFENDANTS DECCO U.S. POST-HARVEST, INC., CEREXAGRI, INC. D/B/A
DECCO POST-HARVEST, AND UPL, LTD.’S FINAL INVALIDITY CONTENTIONS**

Pursuant to Paragraph 2(h) of the Court’s September 29, 2017 Scheduling Order (D.I. 122), Defendants Decco U.S. Post-Harvest, Inc., Cerexagri, Inc. d/b/a Decco Post-Harvest, and UPL, Ltd. (collectively, “the Decco/UPL Defendants” or “the Defendants”)¹ through their undersigned counsel, provides the following Final Invalidity Contentions to Plaintiff AgroFresh, Inc. The Decco/UPL Defendants contend that each of the claims asserted by AgroFresh is invalid under at least 35 U.S.C. §§ 102, 103, and/or 112.

I. GENERAL STATEMENTS AND OBJECTIONS

A. Asserted Claims

AgroFresh served the Decco/UPL Defendants with Amended Infringement Contentions pursuant to the Court’s Scheduling Order alleging infringement of U.S. Patent Nos. 6,017,849 and 6,313,068 (“the Daly patents”), and 9,394,216 (collectively, “Asserted Patents”). AgroFresh has

¹ Essentiv was a joint venture between MirTech, Inc. and Decco U.S. Post-Harvest, Inc. Due to the settlement and consent judgment by MirTech, these Final Invalidity Contentions are also being served by Decco as a member of that former joint venture.

alleged that the Decco/UPL Defendants infringes claims 1 and 10 of the '849 Patent, claims 1 and 6 of the '068 Patent, and claims 1, 6-8, and 13 of the '216 Patent (collectively, "Asserted Claims").

Paragraph 2(h) of the Scheduling Order requires that a defendant accused of infringement provide final invalidity contentions with regard to the claims asserted against it within thirty (30) days after the Court's January 2, 2019 decision on claim construction. The Decco/UPL Defendants therefore provide these contentions for each Asserted Claim. The Decco/UPL Defendants do not provide any contentions regarding any claim not asserted against them. To the extent that AgroFresh is permitted to assert additional claims against the Decco/UPL Defendants in the future, the Decco/UPL Defendants reserve all rights to disclose new or supplemental invalidity contentions regarding such claims.

B. Claim Construction

On January 2, 2019, the Court construed the Asserted Claims. *See* D.I. 374-375; *see also* D.I. 338. The Decco/UPL Defendants' Final Invalidity Contentions are based on the Court's construction of the Asserted Claims, as well as the infringement positions that AgroFresh appeared to assert in its Amended Infringement Contentions (served Sept. 8, 2018), whether or not the Decco/UPL Defendants agree that AgroFresh's positions are consistent with the Court's construction of the Asserted Claims. Any statement herein describing or tending to describe any claim element beyond the Court's construction is provided for the purpose of responding to AgroFresh's Amended Infringement Contentions. Similarly, any statement consistent with or implicit in AgroFresh's Amended Infringement Contentions is provided for the purpose of responding to AgroFresh's Amended Infringement Contentions.

C. Ongoing Expert Discovery and Right to Supplement

The Decco/UPL Defendants' invalidity positions will be the subject of expert testimony. The Decco/UPL Defendants hereby incorporate into these Final Invalidity Contentions, in their

entirety, the opening and reply expert reports of Mircea Dincă, Ph.D. on patent invalidity. To the extent that AgroFresh or its experts are permitted to assert additional claims or new infringement theories against the Decco/UPL Defendants in the future, the Decco/UPL Defendants reserve the right to supplement their Final Invalidity Contentions regarding such additional claims and infringement theories including, without limitation, adding additional prior art and grounds of invalidity.

D. Prior Art Identification and Citation

The Decco/UPL Defendants identify specific portions of prior art references that disclose the elements of the Asserted Claims. The specific portions, however, are not exhaustive. They are simply exemplary as to the teachings of a particular prior art reference and how those teachings relate to the elements of the Asserted Claims. For example, while the Decco/UPL Defendants have identified at least one citation per claim element for each prior art reference, each and every disclosure of that same element in that prior art reference is not necessarily identified. In addition, where the Decco/UPL Defendants identify a particular figure in a prior art reference, the identification should be understood to encompass the caption and description of the figure as well as any text relating to the figure in the specification and prosecution history in addition to the figure itself. Similarly, where an identified portion of text refers to a figure or other material, the identification should be understood to include the referenced figure or other material as well.

It also should be recognized that a person of ordinary skill in the art would generally read a prior art reference as a whole and in the context of other publications, literature, and general knowledge in the field. To understand and interpret any specific statement or disclosure in a prior art reference, a person of ordinary skill in the art would rely upon other known information including other publications and general scientific or engineering knowledge.

The Decco/UPL Defendants reserve the right to rely upon other unidentified portions of the prior art references and on other publications and expert testimony to provide context and to aid understanding and interpretation of the identified portions. The Decco/UPL Defendants also reserve the right to rely upon other portions of the prior art references, other publications, and the testimony of experts to establish that the alleged inventions would have been obvious to a person of ordinary skill in the art, including on the basis of modifying or combining certain cited references. The Decco/UPL Defendants also reserve the right to rely upon any admissions relating to prior art in the Asserted Patent, its prosecution history, in this litigation, in any post-grant challenge at the Patent Office, or otherwise.

II. INVALIDITY CONTENTIONS

A. Asserted Claims Invalid under 35 U.S.C. §§ 102 and 103

1. The Daly '849 and '068 Patents

Each of the Asserted Claims of the Daly '849 and '068 Patents is anticipated and/or rendered obvious by prior art. The Decco/UPL Defendants identify the prior art that anticipates or renders an Asserted Claim obvious in Exhibits A-C. Exhibits A-C include invalidity claim charts specifically identifying where each element of each Asserted Claim is found in the prior art. These charts, however, are merely examples. The claimed features are similarly described or disclosed in other places (including in all of the documents cited during prosecution of each piece of prior art), and also were present when prior art systems practicing the described prior art were used before the applications that led to the Asserted Patents were filed. Thus, the Decco/UPL Defendants reserve the right to rely on other evidence of the prior art beyond merely the exemplary references cited in Exhibits A-C. For the references cited in Exhibits A-C, each listed document or item became prior art at least as early as the dates given.

Exhibits A-C include charts directed to each of the following anticipation and/or obviousness combinations:

- Janz, et al., U.S. Patent No. 5,321,014² (DECCO-00073617 - DECCO-00073643), and/or Janz in view of Sisler, U.S. Patent No. 5,518,988³ (DECCO-00074491 - DECCO-00074501), and/or Sisler, et. al., *Comparison of cyclopropene, 1-methylcyclopropene, and 3,3-dimethylcyclopropene as ethylene antagonists in plants*, Plant Growth Regulation Vol. 18, pp. 169-74 (1996)⁴ (DECCO-00073658 - DECCO-00073663);
- Duchene, et al., *Industrial uses of cyclodextrins and their derivatives*, J. Coord. Chem. 1992, Vol. 27, pp. 223-236 (1992)⁵, (DECCO-00074202 - DECCO-00074215, in view of Sisler, U.S. Patent No. 5,518,988 (DECCO-00074491 - DECCO-00074501) and/or Sisler, et. al., *Inhibitors of ethylene responses in plants at the receptor level: Recent developments*, Physiologia Plantarum, Vol. 100 pp. 577-582 (1997)⁶ (DECCO-00074268 - DECCO-00074273); and

² Janz, et al., U.S. Patent No. 5,321,014, issued on June 14, 1994—more than one year before the filing of the '849 and '068 Patents—and thus qualifies as prior art under 35 U.S.C. § 102(b).

³ Sisler, U.S. Patent No. 5,518,988, issued on May 21, 1996—more than one year before the filing of the '849 and '068 Patents—and thus qualifies as prior art under 35 U.S.C. § 102(b).

⁴ Sisler, et. al., *Comparison of cyclopropene, 1-methylcyclopropene, and 3,3-dimethylcyclopropene as ethylene antagonists in plants*, Plant Growth Regulation Vol. 18, pp. 169-74 (1996) published in 1996—more than one year before the filing of the '849 and '068 Patents—and thus qualifies as prior art under 35 U.S.C. § 102(b).

⁵ Duchene, et al., *Industrial uses of cyclodextrins and their derivatives*, J. Coord. Chem. 1992, Vol. 27, pp. 223-236 (1992) published in 1992—more than one year before the filing of the '849 and '068 Patents—and thus qualifies as prior art under 35 U.S.C. § 102(b).

⁶ Sisler, et. al., *Inhibitors of ethylene responses in plants at the receptor level: Recent developments*, Physiologia Plantarum, Vol. 100 pp. 577-582 (1997) published in 1997—before the filing of the '849 patent and more than one year before the filing of the '068 patent—and thus qualifies as prior art under 35 U.S.C. § 102(a) or (b).

- Szejtli, U.S. Patent No. 4,380,626⁷ (DECCO-00074441 - DECCO-00074445), in view of Sisler, U.S. Patent No. 5,518,988 (DECCO-00074491 - DECCO-00074501) and/or Sisler, et. al., *Inhibitors of ethylene responses in plants at the receptor level: Recent developments*, Physiologia Plantarum, Vol. 100 pp. 577-582 (1997) (DECCO-00074268 - DECCO-00074273).

Additional prior art references, which are relied upon to illustrate the state of the art, the knowledge possessed by a person of ordinary skill, to address alleged secondary considerations, or for other context surrounding obviousness, are identified below:

- Cramer, et. al., *Compounds of α -cyclodextrin with Gases, On Inclusion Compounds [“Clathrates”]*, XII, No. 20., pp. 2572-75 (1957) (with translation), DECCO-00165850 – DECCO-00165859.
- Szejtli et. al., *Molecular encapsulation of volatile, easily oxidizable labile flavor substances by cyclodextrins*, Acta Chem. Acad. Sci. Hung. 101 (1-2) pp. 27-46 (1979), DECCO-00165542 - DECCO-00165561;
- Shahidi, et. al., *Encapsulation of Food Ingredients*, Critical Reviews in Food Science and Nutrition, Vol. 33, No. 6, pp. 501-47 (1993), DECCO-00074216 - DECCO-00074262;
- Roelofsen, *Molecular Sieve Zeolites Properties and Applications in Organic Synthesis* (1972), DECCO-00165562 - DECCO-00165656;
- Szejtli, *Introduction and General Overview of Cyclodextrin Chemistry*, Chem Rev., Vol. 98, pp. 1743-53 (1998), DECCO-00074404 - DECCO-00074415.

⁷ Szejtli, U.S. Patent No. 4,380,626, issued on April 19, 1983—more than one year before the filing of the '849 and '068 Patents—and thus qualifies as prior art under 35 U.S.C. § 102(b).

To the extent any limitation has a similar recitation or is construed to have a similar meaning, or to encompass similar feature(s) and/or function(s), with any other claim limitation, and to the extent at least one claim chart in Exhibits A-C hereto identifies any prior art reference as disclosing or teaching such similarly construed claim limitation, such identified prior art reference and the Decco/UPL Defendants' contentions with respect to same, are incorporated by reference.

To the extent that they are prior art, the Decco/UPL Defendants reserve the right to rely upon (1) foreign counterparts of the U.S. Patents identified in the Decco/UPL Defendants' Final Invalidity Contentions, (2) U.S. counterparts of foreign patents and foreign patent applications identified in the Decco/UPL Defendants' Final Invalidity Contentions, and (3) U.S. and foreign patents and patent applications corresponding to articles and publications identified in the Decco/UPL Defendants' Final Invalidity Contentions.

The claim charts of Exhibits A-C provide exemplary citations within the prior art references that teach or suggest each and every element of the Asserted Claims. Each reference or combination of references suggested by each chart indicates whether the prior art renders the claim obvious or anticipated.

The discussion of invalidity based on obviousness in these Invalidity Contentions and their associated claims charts follows well-established precedent. The U.S. Supreme Court decision in *KSR International Co. v. Teleflex Inc.*, 550 U.S. 398, 127 S.Ct. 1727, 1739 (2007) ("KSR") held that patents that are based on new combinations of elements or components already known in a technical field may be found to be obvious. Specifically, the Court in *KSR* rejected a rigid application of the "teaching, suggestion, or motivation [to combine]" test. *Id.* at 1741. "In determining whether the subject matter of a patent claim is obvious, neither the particular

motivation nor the avowed purpose of the patentee controls. What matters is the objective reach of the claim.” *Id.* at 1741–42. “Under the correct analysis, any need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed.” *Id.* at 1742. In particular, the Supreme Court emphasized the principle that “[t]he combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results.” *Id.* at 1739. A key inquiry is whether the “improvement is more than the predictable use of prior art elements according to their established function.” *Id.* at 1740.

The rationale to combine or modify prior art references is significantly stronger when the references seek to solve the same problem, come from the same field, and correspond well. *In re Inland Steel Co.*, 265 F.3d 1354, 1362 (Fed. Cir. 2001) (allowing two references to be combined as invalidating art under similar circumstances where the art “focus[ed] on the same problem . . . c[a]me from the same field of art [and] . . . the identified problem found in the two references correspond[ed] well”).

In view of *KSR*, the PTO issued a set of new Examination Guidelines. *See Examination Guidelines for Determining Obviousness Under 35 U.S.C. 103 in View of the Supreme Court Decision in KSR International Co. v. Teleflex Inc.*, 72 Fed. Reg. 57,526 (Oct. 10, 2007). Those Guidelines identified various rationales for finding a claim obvious, including:

- (A) Combining prior art elements according to known methods to yield predictable results;
- (B) Simple substitution of one known element for another to obtain predictable results;
- (C) Use of known technique to improve similar devices (methods, or products) in the same way;
- (D) Applying a known technique to a known device (method, or product) ready for improvement to yield predictable results;

- (E) “Obvious to try” - choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success;
- (F) Known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations would have been predictable to one of ordinary skill in the art;
- (G) Some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention.

Id. at 57,529.

Multiple teachings, suggestions, motivations, and/or reasons to modify any of the references and/or to combine any two or more of the references in Exhibits A-C come from many sources, including the prior art (specific and as a whole), common knowledge, common sense, predictability, expectations, industry trends, design incentives or need, market demand or pressure, market forces, obviousness to try, the nature of the problem faced, and/or knowledge possessed by a person of ordinary skill. Dr. Dincă, in his reports, provides opinions and analyses as to the teachings, suggestions, motivations, and/or reasons to modify the references cited in Exhibits D-H. Those opinions and analyses are incorporated herein by reference in their entirety.

2. The '216 Patent

Each of the Asserted Claims of the '216 Patent is anticipated and/or rendered obvious by prior art. As a preliminary matter, none of the Asserted Claims of the '216 Patent are entitled to claim the benefit of the filing date of the '216 Patent's U.S. provisional application no. 62/077,867 (“the '867 provisional”), as UPL Ltd. explained in its IPR Petition. *See* DECCO-00072529; DECCO-00072533 - DECCO-00072536. Accordingly, the Asserted Claims of the '216 Patent have an effective filing date of May 29, 2015, because they are not entitled to claim a right of priority under 35 U.S.C. §119(a) to the '867 provisional.

The Decco/UPL Defendants identify the prior art that anticipates or renders an Asserted Claim obvious in Exhibits D-H. Exhibits D-H include invalidity claim charts identifying where each element of each Asserted Claim is found in the prior art. These charts, however, are merely examples. The claimed features are similarly described or disclosed in other places (including in all the documents cited during prosecution of each piece of prior art), and also were present when prior art systems practicing the described prior art were used before the applications that led to the Asserted Patents were filed.

Thus, the Decco/UPL Defendants reserve the right to rely on other evidence of the prior art beyond merely the exemplary references cited in Exhibits D-H. For the references cited in Exhibits D-H, each listed document or item became prior art at least as early as the dates given.

Exhibits D-H include charts directed to each of the following anticipation and/or obviousness combinations:

- EthlyBloc⁸, as exemplified in DECCO-00074416 - DECCO-00074429, AF00499805 - AF00499810, DECCO-00074430 - DECCO-00074440, AF00499982, AF00499905, in view of Edgington, et al., Int'l Pub. No. WO 2016/037043 ("Edgington")⁹, DECCO-00072767 - DECCO-00072888, and optionally further in view of Böhlmann, et. al., *Characterization of the Metal-*

⁸ EthlyBloc sachets are prior art to the '216 patent. As explained in exemplary paragraphs 247-252 of the Opening Report of Mircea Dincă, Ph.D. on Patent Invalidity, EthlyBloc and EthlyBloc sachets were known as a commercially available products in the U.S. more than one year before the filing date of the '216 patent. EthlyBloc and EthlyBloc sachets, for example, were discussed in published literature (e.g., US EPA applications, approvals, and labels), as well as sales and marketing materials. This public knowledge through publications, uses, sales, and/or offers for sale of EthlyBloc and EthlyBloc sachets in the U.S. more than one year before the filing of the '216 patent qualifies EthlyBloc and EthlyBloc sachets as prior art under 35 U.S.C. § 102(a).

⁹ Edgington claims priority to a provisional application filed on September 5, 2014, which is prior to the filing of the non-provisional application that issued as the '216 patent (which was filed on May 29, 2015). Thus, Edgington qualifies as prior art under 35 U.S.C. § 102(a).

Organic Framework Compound and Cu₃(benzene 1,3,5-tricarboxylate)₂ by means of ¹²⁹Xe Nuclear Magnetic and Electron Paramagnetic Resonance Spectroscopy, J. Phys. Chem. B, Vol. 110, pp. 20177-81 (2006) (“Böhlmann”)¹⁰, DECCO-00165657 – DECCO-00165661;

- Leung, et al., U.S. Patent No. 8,569,407 (“Leung”)¹¹ (DECCO-00074829 - DECCO-00074850), in view of EthylBloc and optionally further in view of Böhlmann;
- Böhlmann in view of EthylBloc;
- Edgington, optionally further in view of Böhlmann; and
- The ’849 Patent¹², in view of EthylBloc and optionally further in view of Böhlmann.

Additional references, which are relied upon to illustrate the state of the art, the knowledge possessed by a person of ordinary skill, to address alleged secondary considerations, or for other context surrounding obviousness, are identified below:

- Kostansek, U.S. Patent No. 6,548,448 (issued Apr. 15, 2003) (“Kostansek”), DECCO-00072895 - DECCO-00072909;

¹⁰ Böhlmann, et. al., Characterization of the Metal-Organic Framework Compound and Cu₃(benzene 1,3,5-tricarboxylate)₂ by means of ¹²⁹Xe Nuclear Magnetic and Electron Paramagnetic Resonance Spectroscopy, J. Phys. Chem. B, Vol. 110, pp. 20177-81 (2006) published in 2006, and thus qualifies as prior art under 35 U.S.C. § 102(a).

¹¹ Leung, et al., U.S. Patent No. 8,569,407, issued on October 29, 2013, and thus qualifies as prior art under 35 U.S.C. § 102(a).

¹² The ’849 Patent issued on January 25, 2000, and thus qualifies as prior art under 35 U.S.C. § 102(b).

- Lee, et. al., *Development of a 1-Methylcyclopropene (1-MCP) Sachet Release System*, Journal of Food Science, Vol. 71, No. 1 pp. C1-C6 (2006) (“Lee”), DECCO-00072889 - DECCO-00072894;
- Regulatory Note 1-methylcyclopropene, Canada Pest Management Regulatory Agency (2004) (“Regulatory Note”), DECCO-0060612 - DECCO-0060667;
- Ho, et. al., Encapsulation of gases in powder solid matrices and their applications: A review, Powder Technology, Vol. 259, pp. 87-108 (2014) (“Ho”), DECCO-00074664 - DECCO-00074685;
- Binder, et. al., *A Model for Ethylene Receptor Function and 1-Methylcyclopropene Action*, Issues and Advances in Postharvest Horticulture, XXVI International Horticultural Congress, Vol. 1. (2002) (“Binder”), DECCO-00165662 - DECCO-00165676;
- Hall et. al., *Ethylene Receptors: Ethylene Perception and Signal Transduction*, J. Plant Growth Regulation, Vol. 26, pp. 118-130 (2007) (“Hall”), DECCO-00165677 - DECCO-00165689;
- Herm, et. al., *Hydrocarbon Separations in Metal-Organic Frameworks*, Chem. Mater., Vol. 26, pp. 323-38 (2014) (“Herm”), DECCO-00165690 - DECCO-00165705;
- Neoh, et. al., *Kinetics of Molecular Encapsulation of 1-Methylcyclopropene into α -cyclodextrin*, J. Agric. Food Chem., Vol. 55, pp. 11020-26 (2007) (“Neoh”), DECCO-00072944 - DECCO-00072950;
- Long, et al., U.S. Patent Application 13/965,098, Publication No. 2014/0061540 (published Mar. 6, 2014) (“Long”), DECCO-00165860 - DECCO-00165899;

- Hartmann, et. al., *Adsorptive Separation of Isobutene and Isobutane on $Cu_3(BTC)_2$* , Langmuir, Vol. 24, pp. 8634-42 (2008) (“Hartmann”), DECCO-00073055 - DECCO-00073063;
- Furukawa et. al., *The Chemistry and Applications of Metal-Organic Frameworks*, Science, Vol. 341 (2013) (“Furukawa”), DECCO-00093697 - DECCO-00093710;
- Rossin, et. al., *Phase Transitions and CO_2 Adsorption Properties of Polymeric Magnesium Formate*, Cryst. Growth & Des., Vol. 8, No. 9, pp. 3302-08 (2008) (“Rossin”), DECCO-00073535 - DECCO-00073541;
- Rood, et. al., *Synthesis, Structural Characterization, Gas Sorption and Guest-Exchange Studies of the Lightweight, Porous Metal-Organic Framework α - $[Mg_3(O_2CH)_6]$* , Inorg. Chem., Vol. 45, pp. 5521-28 (2006) (“Rood”), DECCO-00073003 - DECCO-00073010;
- Horcajada et. al., *Metal-Organic Frameworks in Biomedicine*, Chem. Rev., Vol. 112, pp. 1232-68 (2012) (“Horcajada”), DECCO-00072961 - DECCO-00072997;
- Jacobson, et al., EP Patent Application No. 2,100,661 (“Jacobson”), DECCO-00072951 - DECCO-00072960;
- SmartFresh Registration Report, Part A Risk Management, Country: Germany (7/12/2012) (“SmartFresh Registration Report”), DECCO-00053329 - DECCO-00053534;
- Janssen, et. al., *Ethylene detection in fruit supply chains*, Phil. Trans. R. Soc. A. Vol. 372 (2013) (“Janssen”), AF00403504 - AF00403524;

- Bloch, et. al., Hydrocarbon Separations in a Metal-Organic Framework with Open Iron(II) Coordination Sites, *Science*, Vol. 335 (2012) (“Bloch”), DECCO-00073049 - DECCO-00073054;
- Chopra, et. al., *Metal-organic frameworks have utility in adsorption and release of ethylene and 1-methylcyclopropene in fresh produce packaging*, *Postharvest Biology and Technology*, Vol. 130, pp. 48-55, (2017) (“Chopra”), DECCO-00160184 - DECCO-00160191;
- Krishna, et. al., *Influence of adsorption thermodynamics on guest diffusivities in nanoporous crystalline materials*, *Phys. Chem. Chem. Phys.*, Vol. 15, pp. 7994-8016 (2013) (“Krishna”), DECCO-00165706 - DECCO-00165728;
- Banerjee, et. al., *A Calcium Coordination Framework Having Permanent Porosity and High CO₂/N₂ Selectivity*, *Cryst. Growth & Des.*, Vol. 12, pp. 2162-65 (2012) (“Banerjee”), DECCO-00073114 - DECCO-00073117;
- AgroFresh documents related to 1-MCP/MOF technology: AF00527025-29; AF00440934-35; AF00508759-61; AF00582193-02; AF00579404-15; AF00000000127-29;
- Deposition transcript of Krista S. Walton, Ph.D., IPR2017-01919, (PTAB Aug. 21, 2018); and
- Deposition Transcript of Robert Lynn Oakes, Ph.D., AgroFresh Inc. v. MirTech, Inc., Nazir Mir, Essentiv LLC, Decco U.S. Post-Harvest, Inc., Cerexagri, Inc. d/b/a Decco Post-Harvest, and UPL Ltd., C.A. No. 16-662-MN-SRF (Nov. 1, 2018).

To the extent any limitation has a similar recitation or is construed to have a similar meaning, or to encompass similar feature(s) and/or function(s), with any other claim limitation, and to the extent at least one claim chart in Exhibits D-H hereto, or the Petition or Institution Decision in IPR2017-01919 or any related proceeding, identifies any prior art reference as disclosing or teaching such similarly construed claim limitation, such identified prior art reference and the Decco/UPL Defendants' contentions with respect to same, are incorporated by reference.

To the extent that they are prior art, the Decco/UPL Defendants reserve the right to rely upon (1) foreign counterparts of the U.S. Patents identified in the Decco/UPL Defendants' Final Invalidity Contentions, (2) U.S. counterparts of foreign patents and foreign patent applications identified in the Decco/UPL Defendants' Final Invalidity Contentions, and (3) U.S. and foreign patents and patent applications corresponding to articles and publications identified in the Decco/UPL Defendants' Final Invalidity Contentions.

The claim charts of Exhibits D-H provide exemplary citations within the prior art references that teach or suggest each and every element of the Asserted Claims. Each reference or combination of references suggested by each chart indicates whether the prior art renders the claim obvious or anticipated. For example, each of the Asserted Claims of the '216 Patent is anticipated and/or rendered obvious by the prior art combinations identified in *inter partes* review no. IPR2017-01919. The Petition and the Institution Decision of the Patent Trial and Appeal Board of the United States Patent and Trademark Office in that IPR proceeding, and all related proceedings, are incorporated by reference in their entirety. *See, e.g.*, DECCO-00072517 - DECCO-00073541; DECCO-00075126 - DECCO-00075163.

Again, the discussion of invalidity based on obviousness in these Invalidity Contentions and their associated claims charts follows well-established precedent. The U.S. Supreme Court

decision in *KSR International Co. v. Teleflex Inc.*, 550 U.S. 398, 127 S.Ct. 1727, 1739 (2007) (“KSR”) held that patents that are based on new combinations of elements or components already known in a technical field may be found to be obvious. Specifically, the Court in *KSR* rejected a rigid application of the “teaching, suggestion, or motivation [to combine]” test. *Id.* at 1741. “In determining whether the subject matter of a patent claim is obvious, neither the particular motivation nor the avowed purpose of the patentee controls. What matters is the objective reach of the claim.” *Id.* at 1741–42. “Under the correct analysis, any need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed.” *Id.* at 1742. In particular, the Supreme Court emphasized the principle that “[t]he combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results.” *Id.* at 1739. A key inquiry is whether the “improvement is more than the predictable use of prior art elements according to their established function.” *Id.* at 1740.

The rationale to combine or modify prior art references is significantly stronger when the references seek to solve the same problem, come from the same field, and correspond well. *In re Inland Steel Co.*, 265 F.3d 1354, 1362 (Fed. Cir. 2001) (allowing two references to be combined as invalidating art under similar circumstances where the art “focus[ed] on the same problem . . . c[a]me from the same field of art [and] . . . the identified problem found in the two references correspond[ed] well”).

In view of *KSR*, the PTO issued a set of new Examination Guidelines. *See* Examination Guidelines for Determining Obviousness Under 35 U.S.C. 103 in View of the Supreme Court Decision in *KSR International Co. v. Teleflex Inc.*, 72 Fed. Reg. 57,526 (Oct. 10, 2007). Those Guidelines identified various rationales for finding a claim obvious, including:

- (A) Combining prior art elements according to known methods to yield predictable results;
- (B) Simple substitution of one known element for another to obtain predictable results;
- (C) Use of known technique to improve similar devices (methods, or products) in the same way;
- (D) Applying a known technique to a known device (method, or product) ready for improvement to yield predictable results;
- (E) “Obvious to try” - choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success;
- (F) Known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations would have been predictable to one of ordinary skill in the art;
- (G) Some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention.

Id. at 57,529.

Multiple teachings, suggestions, motivations, and/or reasons to modify any of the references and/or to combine any two or more of the references in Exhibits D-H come from many sources, including the prior art (specific and as a whole), common knowledge, common sense, predictability, expectations, industry trends, design incentives or need, market demand or pressure, market forces, obviousness to try, the nature of the problem faced, and/or knowledge possessed by a person of ordinary skill. Dr. Dincă, in his reports, provides opinions and analyses as to the teachings, suggestions, motivations, and/or reasons to modify the references cited in Exhibits D-H. Those opinions and analyses are incorporated herein by reference in their entirety.

B. Asserted Claims Invalid under 35 U.S.C. § 112

The Decco/UPL Defendants contend that certain claims of the Asserted Patents are invalid under 35 U.S.C. § 112. Dr. Dincă, in his reports, provides opinions and analyses as to the

invalidity of the Asserted Patents under § 112. Those opinions and analyses are incorporated herein by reference in their entirety and provided in the sections below.

The Decco/UPL Defendants’ contentions that the following claims are invalid under § 112 do not constitute, and should not be interpreted as, admissions regarding the construction or scope of the claims of the Asserted Patents, or that any of the claims of the Asserted Patents are not anticipated or rendered obvious by any prior art, including the prior art discussed in this contention, the pending IPR proceeding, or the expert reports of Dr. Dincă on patent invalidity.

1. The ’849 and ’068 Patents

i. The Dependent Claims Recitation of “Zeolites” Renders the Term “Molecular Encapsulation Agent” Indefinite and/or Not Enabled

All Asserted Claims of the ’849 and ’068 Patents are invalid as indefinite under § 112, second paragraph, because the scope of the claim term, “molecular encapsulation agent,” is not reasonably certain. The issue of indefiniteness stems from certain dependent claims that specifically recite “a zeolite” as a molecular encapsulation agent. *See, e.g.*, ’849 Patent at claims 2, 7, and 11; ’068 Patent at claims 2, 7. Because the term “zeolite” is specifically included in these dependent claims, zeolites must also be included in claims 1 and 10 of the ’849 patent (the claims from which claims 2, 7, and 11 of the ’849 patent depend) and claims 1 and 6 of the ’068 patent (from which claims 2 and 7 of that patent depend).

But one of ordinary skill in the art would understand that zeolites are not molecular encapsulation agents. Zeolites do not encapsulate (as that term is defined in the Daly patents); they adsorb. Adsorption into a zeolite is shown schematically below.

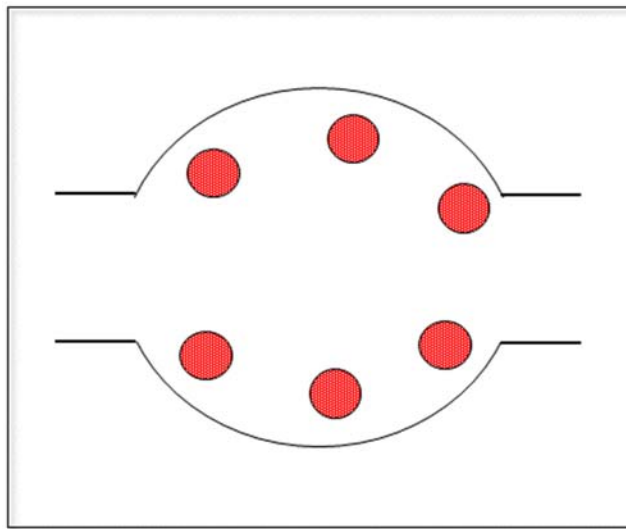


Figure 1. Schematic depiction of 1-MCP adsorbed into a zeolite.

As schematically depicted above, gases adsorb onto the surface of pores in zeolites. The number of guest molecules that may adsorb onto the internal pore surface of a zeolitic particle depends on the pore size. Guest molecules may line the surface of pores, as shown above.

Simple adsorption is not encapsulation. As explained in the Daly patents, “the molecular encapsulation agent complex of the present invention demonstrate[s] a substantially complete entrapment of the methylcyclopropene.” ’849 Patent at 20:12-15. Zeolites (recited in dependent claims 2, 7, and 11) do not encapsulate or entrap 1-MCP. Nor do the Daly patents provide any indication that they could encapsulate any other compound within claim 1. This difference is highlighted by the Daly patents, which specifically include zeolites as *comparative* examples, contrasting them to the claimed invention. ’849 Patent at 19:1-20:20; *see also id.* at 18:37-45 (“The comparative examples demonstrate the benefits of the present invention (utilizing an alpha-cyclodextrin/methylcyclopropene complex) as compared to traditional solid inert carriers, such as wood flour and molecular sieves [zeolites]. Specifically, these comparative examples demonstrate the amount of methylcyclopropene absorbed by traditional solid carriers as compared to that

entrapped by utilizing a molecular encapsulation agent, alpha-cyclodextrin, of the present invention.”).

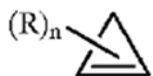
Including absorbent materials such as zeolites as “molecular encapsulation agents” would make no sense to one of ordinary skill in the art, as there is no indication in the Daly patents that zeolites form a lock-and-key structure with 1-MCP as required by the Court’s construction and the Daly patents’ explicit definition of this term. To the extent that the claim term “molecular encapsulation agent” includes absorbent materials such as zeolites, that term is indefinite, as one of ordinary skill in the art would not understand the claim scope with reasonable certainty, particularly in view of the disclosures *contrasting* such adsorbing agents to the present invention of the Daly patents. ’849 Patent at 19:1-20:20.

ii. The Claimed Class of Compounds in the ’068 Patent Is Indefinite and/or Neither Adequately Described nor Enabled.

With respect to the class of compounds recited in claims 1 and 6 of the ’068 patent, one of ordinary skill in the art would not comprehend that class of compounds with reasonable certainty.

The claims of the ’068 patent recite compounds having from 1 to 10 R groups:

1. A complex formed from a molecular encapsulation agent and a compound having the following structure



wherein n is a number from 1 to 10 and R is selected from the group consisting of hydrogen, saturated or unsaturated C1 to C10 alkyl, hydroxy, halogen, C1 to C10 alkoxy, amino and carboxy.

’068 Patent at claim 1; *see also id.* at claim 6.

Outside the context of the Daly patents, one of ordinary skill in the art would understand that “n” denotes the number of “R” groups that may be attached to cyclopropene. In the context of

the Daly patents, however, that meaning makes no sense, because it is not possible to attach more than four “R” groups to a cyclopropene ring.

Cyclopropene has four—and only four—locations for substituents, depicted below. Apart from these four sites of attachment, there are no locations to which an “R” group could bond on the cyclopropene ring.



Figure 2. Cyclopropene with four substituents (R₁ to R₄).

One of ordinary skill in the art would thus not understand the term (R)_n wherein n may be 1 to 10 and would thus not understand the scope of the class of compounds recited in claims 1 and 6 of the '068 patent with reasonable certainty, rendering those claims indefinite.

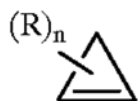
Additionally, if (R)_n refers to the number of groups that could attach to the cyclopropene ring, the Daly patents do not describe or enable one to make or use the claimed class of cyclopropene compounds having (R)_n, where n is a number from 1 to 10. There is no guidance on how one of ordinary skill in the art could prepare compounds having more than four “R” groups. Indeed, it is not possible to attach more than four “R” groups directly to a cyclopropene ring. Because the claimed compounds having more than four “R” groups do not exist and cannot be made, the eight factors that courts consider when evaluating enablement support the conclusion that the Daly patents do not describe or enable one to make or use the claimed class of cyclopropene compounds having (R)_n, where n is a number from 1 to 10.

To the extent that AgroFresh or any of its experts offers a competing interpretation of this claim term, the Decco/UPL Defendants reserve the right to respond to that competing view.

iii. The Daly Patents Do Not Describe or Enable the Broad Genus of Claimed Complexes

The Daly patents do not adequately describe or enable one to make and use the claimed invention without undue experimentation. All asserted claims recite the following (with the expanded limitations of the '068 patent shown in brackets):

. . . . a complex formed from a molecular encapsulation agent and a compound having the following structure:



wherein n is a number from 1 to 4 [10] and R is selected from the group consisting of hydrogen, saturated or unsaturated C1 to C4 [C10] alkyl, hydroxy, halogen, C1 to C4 [C10] alkoxy, amino and carboxy[.]

See '849 Patent at claims 1, 10; '068 Patent at claims 1, 6. The asserted claims cover far more than the lone working example of a complex of 1-MCP in α -cyclodextrin provided in the Daly patents. The Daly patents, however, fail to describe or explain how to make or use the claimed complex with any combination other than 1-MCP and α -cyclodextrin.

For example, the Daly patents claim “crown ethers, polyoxyalkylenes, prophorines [*sic*], polysiloxanes, phosphazenes [*sic*], and zeolites” as molecular encapsulation agents, but the Daly patents do not describe any complex formed with these agents with any compound. See '849 Patent at claim 2. In fact, the Daly patents *contrast* zeolites with the claimed invention. '849 Patent at 18:37-45, 19:1-20:20 (distinguishing molecular sieves, which are zeolites, from the claimed invention). Similarly, the Daly patents fail to identify any compound falling within the scope of claim 1 that would form a lock-and-key structure with any of these agents. Put simply, the Daly patents do not describe any “complex” comprising any crown ether, polyoxyalkylene, “prophorine,” polysiloxane, “phophazene,” or zeolite with any claimed compound. There is

nothing in the Daly patents indicating that the inventors actually invented what they claimed. Thus, to the extent that the claims cover any combination other than 1-MCP encapsulated in α -cyclodextrin, the Daly patents do not adequately describe or explain how to make and use the invention.

With respect to crown ethers, polyoxyalkylenes, prophorines [*sic*], polysiloxanes, phosphazenes [*sic*], the Daly patents do not describe or identify those purported molecular encapsulation agents at all. These agents represent *classes of molecules*, not specific chemical structures. The Daly patents do not identify any particular crown ether, polyoxyalkylene, “prophorine,” polysiloxane, or “phophazene” that could be used as a molecular encapsulation agent, as claimed. These terms are explained below.

Crown ethers represent a class of molecules. The most common unsubstituted crown ethers have the structures depicted below. The Daly patents do not identify any specific crown ether or state whether the claimed crown ethers may be substituted. Nor do the Daly patents identify any suitable compound that may be encapsulated within any crown ether.

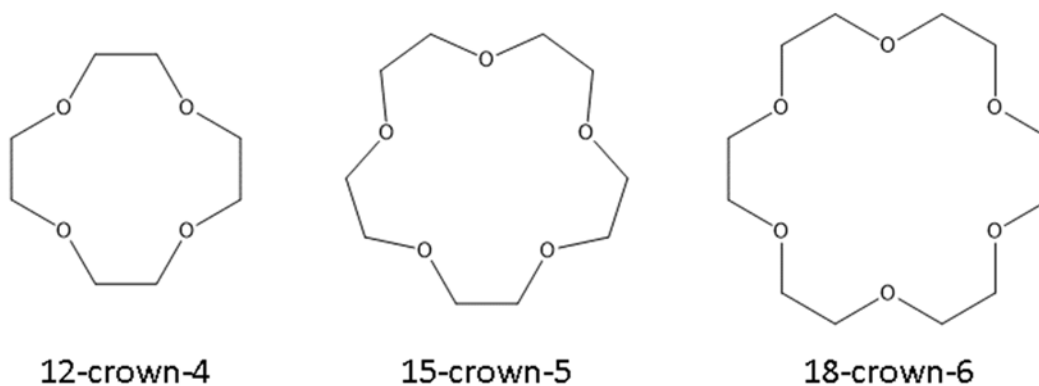


Figure 3. Common unsubstituted crown ethers.

One of ordinary skill in the art would not expect crown ethers to encapsulate cyclopropene derivatives in the same way α -cyclodextrins encapsulates 1-MCP. For example, crown ethers have

a hydrophilic core and a relatively hydrophobic exterior, while cyclodextrins have the opposite—a hydrophobic core and a hydrophilic exterior. Szejtli (1979) at 28 (“The primary and secondary hydroxyl groups are to be found on the opposite edges of the torus-like molecules, the ‘lining of the ring cavity is formed by oxygen bridge atoms; therefore the external surface of cyclodextrins is of hydrophilic, while the interior of the cavity is of hydrophobic character. The consequence of this is that cyclodextrins are able to form inclusion complexes with such substances which are less polar than water.”). Thus, one would not expect crown ethers to have the same types of interactions as α -cyclodextrin with 1-MCP.

Next, the term “polyoxyalkylenes” is not a term commonly used in chemistry. To the extent that this term can be understood, it may refer to a class of polymers that includes, for example, polyethylene glycol and polypropylene glycol, and which have the general structures below. The Daly patents do not identify any specific polyoxyalkylene or identify any suitable compound that may be encapsulated within any polyoxyalkylenes. Nor do the Daly patents provide any guidance on how to encapsulate any compound in a polymeric material such as a “polyoxyalkylene.”

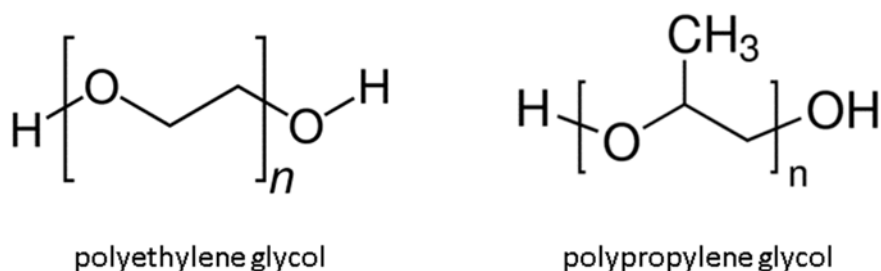


Figure 4. Two types of polyoxyalkylenes.

The term “prophorines” does not refer to any class of known molecules. To the extent that this term has been repeatedly mis-spelled and could be interpreted to refer to *porphyrins*, that term refers to macrocyclic molecules having the parent structure of porphine and related derivatives,

shown below. The Daly patents do not identify any specific porphyrin or identify any suitable compound that may be encapsulated within any porphyrin ring.

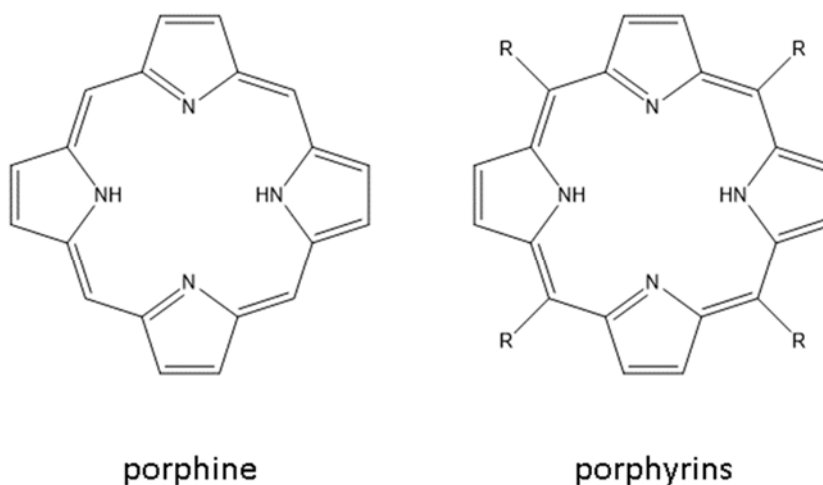


Figure 5. Porphyrin parent structure (porphine) and porphyrins (where R is an aromatic or non-aromatic substituent).

Porphyrins are planar (flat) molecules, as shown by the three-dimensional renderings in the figures below. The planar structure of porphyrins bears no resemblance to the cylindrical structure of cyclodextrins. One of ordinary skill in the art would not expect porphyrins to have the same type of interaction as α -cyclodextrin with 1-MCP. One of ordinary skill in the art would understand that porphyrins cannot encapsulate cyclopropene or its derivatives. At most, porphyrins have space for a lone atom in the center of their ring, e.g., iron cations (Fe^{2+} or Fe^{3+}), as in heme (a component of red blood cells). Iron cations have atomic radii of less than 1 Å (ranging from 0.6 to 0.9 Å for Fe^{2+} and 0.5 to 0.8 Å for Fe^{3+} , depending on the coordination number, *see* CRC Handbook of Chemistry and Physics, 94th Ed.).

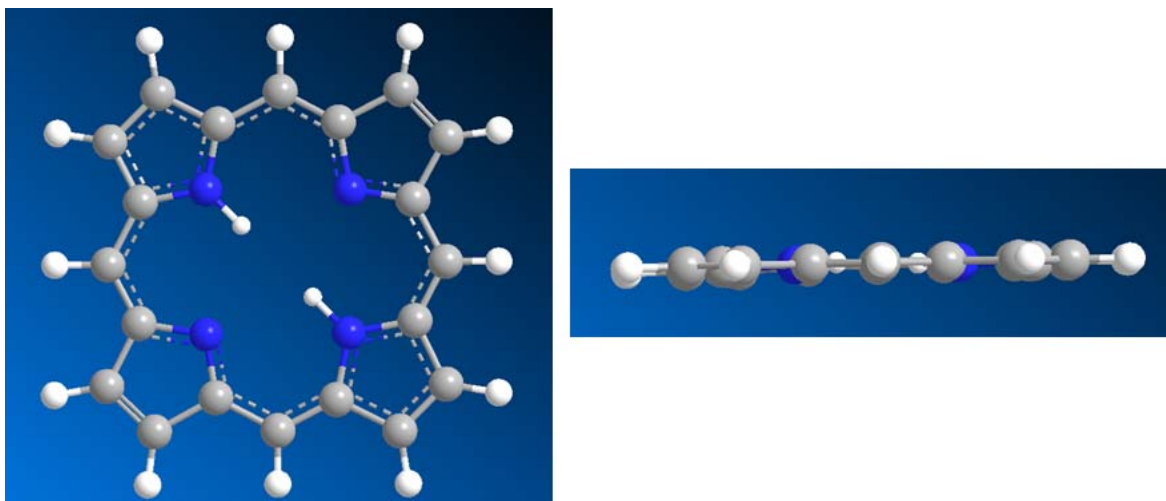


Figure 6. Porphine (porphyrin parent structure) viewed along two axes.

The term “polysiloxanes” refers to a class of molecules having repeating Si-O units. One common polysiloxane is polydimethylsiloxane, shown below. The Daly patents do not identify any specific polysiloxane or any suitable compound that may be encapsulated within any polysiloxane. The general structure of polysiloxanes is shown below, along with two exemplary polysiloxanes structures.

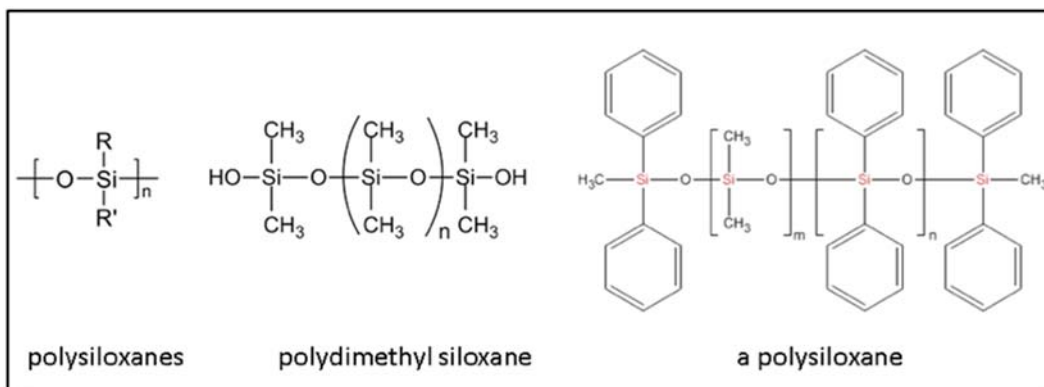


Figure 7. Polysiloxanes.

The term “phophazenes” does not refer to any known class of molecules. To the extent that this term has been repeatedly mis-spelled and could be interpreted to refer to “phosphazenes,” that term refers to any molecule having a phosphorous (P) double-bonded to a nitrogen (N). This is a

very large class of molecules, a few members of which are shown below. The Daly patents do not identify any specific phosphazenes (or phophazene, to the extent such molecules exist) or any suitable compound that may be encapsulated within any phosphazene.

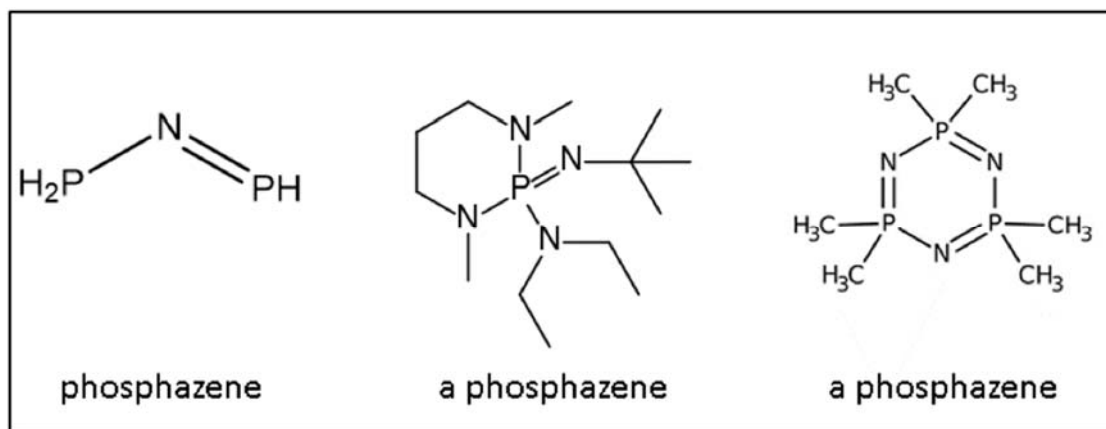


Figure 8. Phosphazenes.

To summarize, the Daly patents (1) do not describe any specific crown ethers, polyoxyalkylenes, prophorines/porphyrins, polysiloxanes, or phophazenes/phosphazenes; (2) do not identify any complex formed using crown ethers, polyoxyalkylenes, prophorines/porphyrins, polysiloxanes, or phophazenes/phosphazenes; and (3) do not provide any guidance on selecting appropriate crown ethers, polyoxyalkylenes, prophorines/porphyrins, polysiloxanes, or phophazenes/phosphazenes to encapsulate a compound of the claimed invention. This is particularly problematic given the wide range of agents encompassed by these terms.

Moreover, to the extent the claimed “molecular encapsulation agent” includes β -cyclodextrin and γ -cyclodextrin, the Daly patents fail to describe or enable one of ordinary skill in the art to make or use complexes comprising these agents, as claimed. The ring structures of β -cyclodextrin and γ -cyclodextrin are larger than α -cyclodextrin and thus, as more recently reported, complexes comprising β - or γ -cyclodextrine with 1-MCP have not been achieved. *See* '216 Patent at 5:1-9 (“the stable complex formation of [1-methylcyclopropene] and β - and γ -cyclodextrins has

not been achieved.”). The Daly patents do not identify or provide any guidance on selecting a compound within the asserted claims that could be encapsulated by β - or γ -cyclodextrin.

Turning to the broad classes of cyclopropene derivatives of the asserted claims, the Daly patents do not describe or provide any guidance on how to make or use a lock-and-key structure involving any claimed compound other than 1-MCP. This is problematic in view of the large scope of the compounds claimed in the Daly patents.

The Daly patents state that the claimed compounds can have from 1 to 4 “R” groups (1 to 10 in the ’068 patent), wherein the “R” groups may be “hydrogen, saturated or unsaturated C1 to C4 [C10] alkyl, hydroxy, halogen, C1 to C4 [C10] alkoxy, amino and carboxy.” ’849 Patent at claims 1, 10. The Daly patents state that the term “‘alkyl’ is defined herein to refer to linear or branched, saturated or unsaturated alkyl groups.” *Id.* at 9:39-40. The class of compounds claimed in the ’849 patent includes over 450,000 permutations. R groups falling within the ’849 patents’ claim scope are listed below.

“R” Group Combinations of the ’849 Patent Claims				
	R₁	R₂	R₃	R₄
hydrogen	H	H	H	H
saturated C1 to C4 alkyl	-CH ₃ -CH ₂ CH ₃ -CH ₂ CH ₂ CH ₃ -CH(CH ₃) ₂ -CH ₂ CH ₂ CH ₂ CH ₃ -CH ₂ CH(CH ₃) ₂ -C(CH ₃) ₃ -CH(CH ₃)CH ₂ CH ₃	-CH ₃ -CH ₂ CH ₃ -CH ₂ CH ₂ CH ₃ -CH(CH ₃) ₂ -CH ₂ CH ₂ CH ₂ CH ₃ -CH ₂ CH(CH ₃) ₂ -C(CH ₃) ₃ -CH(CH ₃)CH ₂ CH ₃	-CH ₃ -CH ₂ CH ₃ -CH ₂ CH ₂ CH ₃ -CH(CH ₃) ₂ -CH ₂ CH ₂ CH ₂ CH ₃ -CH ₂ CH(CH ₃) ₂ -C(CH ₃) ₃ -CH(CH ₃)CH ₂ CH ₃	-CH ₃ -CH ₂ CH ₃ -CH ₂ CH ₂ CH ₃ -CH(CH ₃) ₂ -CH ₂ CH ₂ CH ₂ CH ₃ -CH ₂ CH(CH ₃) ₂ -C(CH ₃) ₃ -CH(CH ₃)CH ₂ CH ₃
unsaturated C1 to C4 alkyl	-CH=CH ₂ -CH=CH ₂ CH ₃ -CH ₂ CH=CH ₂ -CH=CH ₂ CH ₂ CH ₃ -CH ₂ CH=CH ₂ CH ₃ - CH ₂ CH ₂ CH ₂ =CH ₂	-CH=CH ₂ -CH=CH ₂ CH ₃ -CH ₂ CH=CH ₂ -CH=CH ₂ CH ₂ CH ₃ -CH ₂ CH=CH ₂ CH ₃ - CH ₂ CH ₂ CH ₂ =CH ₂	-CH=CH ₂ -CH=CH ₂ CH ₃ -CH ₂ CH=CH ₂ -CH=CH ₂ CH ₂ CH ₃ -CH ₂ CH=CH ₂ CH ₃ - CH ₂ CH ₂ CH ₂ =CH ₂	-CH=CH ₂ -CH=CH ₂ CH ₃ -CH ₂ CH=CH ₂ -CH=CH ₂ CH ₂ CH ₃ -CH ₂ CH=CH ₂ CH ₃ - CH ₂ CH ₂ CH ₂ =CH ₂
hydroxy	OH	OH	OH	OH

“R” Group Combinations of the ’849 Patent Claims				
	R ₁	R ₂	R ₃	R ₄
halogen	F, Cl, Br, or I	F, Cl, Br, or I	F, Cl, Br, or I	F, Cl, Br, or I
C1 to C4 alkoxy	-OCH ₃ -OCH ₂ CH ₃ -OCH ₂ CH ₂ CH ₃ - OCH ₂ CH ₂ CH ₂ CH ₃	-OCH ₃ -OCH ₂ CH ₃ -OCH ₂ CH ₂ CH ₃ - OCH ₂ CH ₂ CH ₂ CH ₃	-OCH ₃ -OCH ₂ CH ₃ -OCH ₂ CH ₂ CH ₃ - OCH ₂ CH ₂ CH ₂ CH ₃	-OCH ₃ -OCH ₂ CH ₃ -OCH ₂ CH ₂ CH ₃ - OCH ₂ CH ₂ CH ₂ CH ₃
amino	NH ₃	NH ₃	NH ₃	NH ₃
carboxy	-CO ₂ -	-CO ₂ -	-CO ₂ -	-CO ₂ -
	22 options	22 options	22 options	22 options
Total:	26 x 26 x 26 x 26 = 456,976			

This enormous class of compounds includes numerous embodiments that do not exist. For example, a search of the Chemical Abstracts Service (www.cas.org) for a few relatively simple structures falling within the asserted claims showed that at least those below do not exist. Chemical Abstracts is a well-known database compiling information on known molecules.

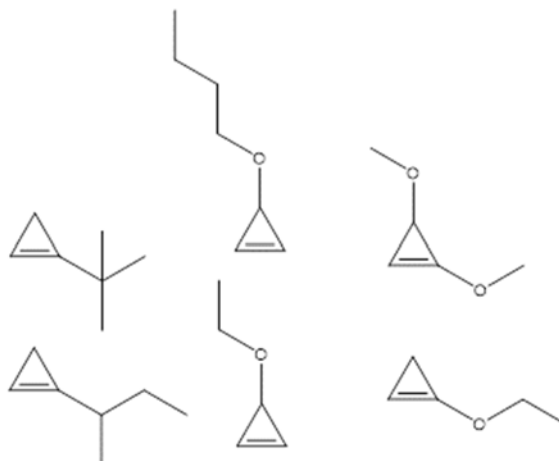


Figure 9. Exemplary compounds within the asserted claims that do not appear to exist.

Despite the enormous class of claimed compounds, the Daly patents do not describe or provide any guidance on how to form any claimed complex, other than the complex involving 1-

MCP and α -cyclodextrin. Absent such description or guidance, one of ordinary skill in the art would not have been able to make or use the claimed invention without undue experimentation.

The eight factors considered by courts when evaluation whether claims are enabled indicate a lack of enablement.

Factor 1. The quantity of experimentation necessary. Because the Daly patents do not describe or provide any guidance on how to form any complex of a molecular encapsulation agent with any claimed molecular encapsulation agent or claimed compound (other than α -cyclodextrin/1-MCP), one of ordinary skill in the art would need to spend an extreme amount of time experimenting to discover which, if any, combinations other than α -cyclodextrin/1-MCP covered by the claims might work.

Factor 2. The amount of direction or guidance presented. As noted above, the Daly patents provide no direction or guidance as to any combination other than α -cyclodextrin/1-MCP. This lone example fails to provide sufficient guidance as to the numerous other embodiments covered by the claims.

Factor 3. The presence or absence of working examples. The lone working example of the Daly patents (1-MCP encapsulated in α -cyclodextrin) does not enable one of ordinary skill in the art to make or use any other claimed embodiment.

Factor 4. The nature of the invention. The nature of the invention involves considerable uncertainty, as one of ordinary skill in the art would not know which combinations of agents and compounds formed the complexes of the claimed invention (other than 1-MCP/ α -cyclodextrin) without first testing them in a laboratory.

Factor 5. The state of the prior art. While the state of the prior art would have led one to the obvious combination of cyclopropene and/or 1-MCP encapsulated in α -cyclodextrin, it would not have provided any motivation or guidance as to any other claimed agent or compound.

Factor 6. The relative skill of those in the art. The relative skill in the art would provide one with the technical expertise to make the obvious combination of cyclopropene or 1-MCP in α -cyclodextrin. However, that skill alone would not have allowed one to make or use any other claimed combination without undue experimentation given the lack of guidance in the Daly patents and the prior art.

Factor 7. The predictability or unpredictability of the art. One of ordinary skill in the art would not have been able to predict which combinations (among the numerous embodiments) would result in a complex of the claimed invention, apart from the obvious examples of cyclopropene and 1-MCP in α -cyclodextrin.

Factor 8. The breadth of the claims. The scope of the claimed molecular encapsulation agents (which includes, e.g., polysiloxanes) combined with the scope of the claimed compounds (having, e.g., 1 to 4 R groups selected from the listed options) renders the asserted claims unduly broad.

Thus, persons of ordinary skill in the art would have to engage in undue experimentation in order to make and use any claimed complex other than cyclopropene or 1-MCP in α -cyclodextrin. For all these reasons, the patents fail to adequately describe or enable the asserted claims.

2. The '216 Patent

i. Lack of written description and enablement

1. “Cu-2,4,6-tris(3,5-dicarboxylphenylamino)-1,3,5-triazine”

The '216 patent does not describe or enable the adsorption of 1-MCP into the surface one or more pores of Cu-2,4,6-tris(3,5-dicarboxylphenylamino)-1,3,5-triazine, one of the MCPNs recited in claims 1, 6, and 13 of the '216 patent and required by claims 7 and 8 (as those claims depend from claim 6).

First, there is no description of adsorbing 1-MCP into this MCPN. In fact, the '216 patent shows that when absorption was attempted, “there was *no absorption*” of 1-MCP into Cu-2,4,6-tris(3,5-dicarboxylphenylamino)-1,3,5-triazine). '216 Patent at 12:2-3 (defining Cu-2,4,6-tris(3,5-dicarboxylphenylamino)-1,3,5-triazine as “S2”); *id.* at 13:53 (reporting “no adsorption” into S2); *id.* at 13:45 (reporting 0% adsorption level in S2). In view of these disclosures, one of ordinary skill in the art would not believe that the inventors actually had possession of what they claimed, e.g., an adsorption complex comprising 1-MCP and Cu-2,4,6-tris(3,5-dicarboxylphenylamino)-1,3,5-triazine. Because this is a feature of all asserted claims, the '216 patent does not adequately describe the invention.

Further, the '216 patent does not explain how to make or an adsorption complex comprising 1-MCP and Cu-2,4,6-tris(3,5-dicarboxylphenylamino)-1,3,5-triazine. In fact, the '216 patent indicates quite the opposite—that 1-MCP is not adsorbed into this MCPN. Given the lack of guidance on whether or how 1-MCP could be successfully adsorbed into this MCPN, the '216 patent does not enable one of ordinary skill in the art to make and use the claimed invention without undue experimentation.

The eight factors considered by courts when evaluating enablement supports this conclusion.

Factor 1. The quantity of experimentation necessary. Because the '216 patent only describes a failed attempt to adsorb 1-MCP into Cu-2,4,6-tris(3,5-dicarboxylphenylamino)-1,3,5-triazine (S2), one of ordinary skill in the art would need to spend a considerable amount of time experimenting to discover which conditions, if any, would allow for such adsorption. Based on the teachings of the '216 patent, this MCPN appears to be a non-working example.

Factor 2. The amount of direction or guidance presented. As noted above, the '216 patent provides no direction or guidance regarding how to achieve 1-MCP adsorption into Cu-2,4,6-tris(3,5-dicarboxylphenylamino)-1,3,5-triazine (S2).

Factor 3. The presence or absence of working examples. The examples in the '216 patent describes a failed attempt to adsorb 1-MCP into Cu-2,4,6-tris(3,5-dicarboxylphenylamino)-1,3,5-triazine (S2). The '216 patent does not describe any successful examples of adsorption of 1-MCP into this MCPN.

Factor 4. The nature of the invention. The nature of the invention involves loading 1-MCP into MCPN structures. While loading levels into other MCPNs structures could be readily achieved, it is unclear whether 1-MCP may be adsorbed into Cu-2,4,6-tris(3,5-dicarboxylphenylamino)-1,3,5-triazine (S2) at all.

Factor 5. The state of the prior art. The prior art does not teach how to adsorb 1-MCP specifically into Cu-2,4,6-tris(3,5-dicarboxylphenylamino)-1,3,5-triazine (S2).

Factor 6. The relative skill of those in the art. The relative skill in the art would provide one with the technical expertise to make adsorption complexes comprising 1-MCP in many MOF/MCPN structures. However, as noted above, because this appears to be a non-working

embodiment, adsorbing 1-MCP into Cu-2,4,6-tris(3,5-dicarboxylphenylamino)-1,3,5-triazine (S2) would be difficult if not impossible to achieve, and thus beyond the level of skill in the art.

Factor 7. The predictability or unpredictability of the art. While adsorption of 1-MCP into MCPNs would be predictable, it appears that the claims include a non-working embodiment. It could not be predicted what conditions, if any, would result in adsorption of 1-MCP into Cu-2,4,6-tris(3,5-dicarboxylphenylamino)-1,3,5-triazine (S2) in view of the disclosures in the '216 patent.

Factor 8. The breadth of the claims. Because the claims specifically include the non-working example of Cu-2,4,6-tris(3,5-dicarboxylphenylamino)-1,3,5-triazine (S2) as an MCPN, the claims are overinclusive.

Thus, the '216 patent does not enable one of ordinary skill in the art to make or use the invention of claims 1, 6-8, and 13 without undue experimentation.

2. “0.001 weight percent to 25 weight percent 1-MCP”

Further, the '216 patent does not describe or enable one of ordinary skill in the art to make and use (without undue experimentation) the claimed 1-MCP/MCPN adsorption complexes having between 0.001 to 25 weight percent 1-MCP, as required by claims 6-8 and 13. For example, the '216 patent does not describe any 1-MCP/MOF adsorption complex containing more than **8.8 wt. %** 1-MCP. *See* '216 Patent at 12:30-13:53, 16:26-17:13. Thus, the maximum adsorption achieved in the '216 patent was only about one third (35%) of the claimed upper limit of 25 weight %. There is no description of any MCPN adsorbing, e.g., 10, 15, 20, or 25 weight percent 1-MCP. As a result, one of ordinary skill in the art would not believe that the inventors actually had possession of what they claimed, e.g., 1-MCP/MCPN adsorption complexes having a range of 1-MCP weight percentages encompassing 0.001 wt. % **to 25 wt. %**.

Nor does the '216 patent teach one of ordinary skill in the art how to make and use such absorption complexes without undue experimentation. The '216 patent provides no guidance on whether any of the recited MCPNs could adsorb more than 8.8 weight percent 1-MCP, or how levels of adsorption from about 9 to 25 weight percent 1-MCP could be achieved.

The claimed range of weight percentages broadly encompasses levels of 1-MCP that could not be achieved with at least two of the claimed MCPNs, magnesium formate and Ca(4,4'-sulfonyldibenzoate). It would not be possible to load more than between 10.7% and 19.3% 1-MCP into magnesium formate. Similar calculations for Ca(4,4'-sulfonyldibenzoate) showed that it would not be possible to load more than between 5.7% and 10.8% 1-MCP into that MCPN. In reality, the actual maximum loading of these MOFs with 1-MCP would be lower.¹³

		Expected Max 1-MCP uptake (%)	
Material	Alt name	Upper range	Lower range
Mg formate	Basosiv™ M050	19.3	10.7
Ca-SDB		10.8	5.7

Because the '216 patent provides no guidance on achieving levels above 8.8 wt % 1-MCP in a claimed MCPN, and because the claimed range of up to 25 wt. % exceeds the maximum 1-MCP loading level in at least two MCPNs, the '216 patent does not enable one of ordinary skill in the art to make and use the invention recited in claims 6-8 and 13 without undue experimentation.

The eight factors considered by courts when evaluating whether claims are enabled indicate a lack of enablement.

¹³ The data for magnesium formate and for CaSDB used in the calculations were taken from Rood and Banerjee, respectively.

Factor 1. The quantity of experimentation necessary. Because the '216 patent does not describe or provide any guidance on achieve 1-MCP weight percentages above 8.8%, one of ordinary skill in the art would need to spend a considerable amount of time experimenting to discover which, if any, MOF/1-MCP combinations could exceed that loading level.

Factor 2. The amount of direction or guidance presented. As noted above, the '216 patent provides no direction or guidance regarding how to achieve 1-MCP loading levels in excess of 8.8 wt. %.

Factor 3. The presence or absence of working examples. The '216 patent does not describe any examples in which 1-MCP was adsorbed into a MOF at more than 8.8 wt. %.

Factor 4. The nature of the invention. The nature of the invention involves loading up to 25 weight % 1-MCP into MOF structures. This would be impossible to achieve in at least two of the recited MCPNs.

Factor 5. The state of the prior art. The prior art does not teach how to exceed 8.8 wt. % 1-MCP in a MOF structure claimed in the '216 patent.

Factor 6. The relative skill of those in the art. The relative skill in the art would have provided one with the technical expertise to make adsorption complexes comprising 1-MCP and MOFs. However, in view of the disclosures in the '216 patent, loading significantly more (up to 25 weight %) of 1-MCP into a MOF would be difficult (and impossible to achieve in some of the recited MCPNs), and thus beyond the level of skill in the art.

Factor 7. The predictability or unpredictability of the art. While adsorption of 1-MCP into MOFs would be predictable, the patent shows that there would be considerable unpredictability in achieving levels significantly above 8.8 wt. % 1-MCP in a claimed MCPN.

Factor 8. The breadth of the claims. The broad range of 1-MCP concentrations extending up to 25 weight percent renders these claims unduly broad.

For all these reasons, the patents fail to adequately describe or enable the asserted claims.

III. ACCOMPANYING DOCUMENT PRODUCTION

The Decco/UPL Defendants previously produced copies of the exemplary invalidating references. The Decco/UPL Defendants reserve the right to rely upon any prior art references identified on the face of the Asserted Patents, in the prosecution histories of the Asserted Patents, and in any post-grant challenge (including *inter partes* review proceedings) related to the Asserted Patents. The Decco/UPL Defendants also reserve the right to rely on any admissions relating to the Asserted Patents, prior art in the Asserted Patents, their prosecution histories, in this litigation, in any post-grant challenge at the Patent Office, or otherwise.

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CERTIFICATE OF SERVICE

I hereby certify that on February 1, 2019, a true and correct copy of the foregoing document was served upon the following attorneys of record by electronic mail:

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